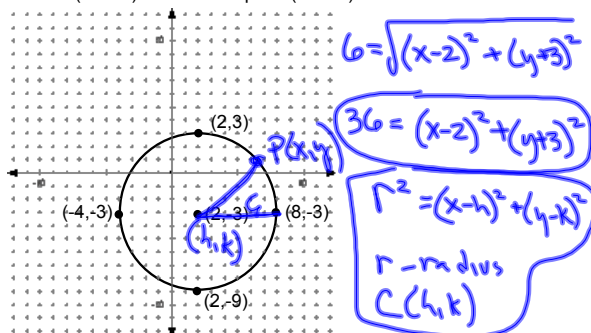


8-3 Circles

Circle—the set of all points, in a plane, a given distance (radius) from a fixed point (center)



Equation of Circle

$$r^2 = (x - h)^2 + (y - k)^2$$

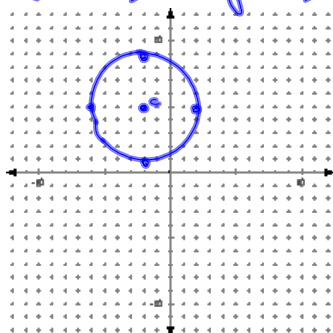
r - radius
 $C(h, k)$

$$r^2 = (x - h)^2 + (y - k)^2$$

Find the equation of a circle with $C(-2, 5)$ and $r = 4$.

$$16 = (x + 2)^2 + (y - 5)^2$$

Graph it.



Find the center and radius.

$$1. \ x^2 + y^2 - 16 = 0$$

$$x^2 + y^2 = 16$$

$$C(0, 0) \quad r = 4$$

Find the center and radius.

$$2. \ x^2 + y^2 + 8y = 0$$

$$x^2 + y^2 + 8y + 16 = +16$$

$$x^2 + (y + 4)^2 = 16$$

$$C(0, -4) \quad r = 4$$

Find the center and radius.

$$3. \ x^2 + y^2 - 4x + 2y - 4 = 0$$

$$x^2 - 4x + 4 + y^2 + 2y + 1 = 4$$

$$(x - 2)^2 + (y + 1)^2 = 9$$

$$C(2, -1) \\ r = 3$$

Find the center and radius.

4. $x^2 + y^2 + 3x + 4y = 0$

$$\begin{aligned} x^2 + 3x + \frac{9}{4} + y^2 + 4y + 4 &= 0 \\ \left(x + \frac{3}{2}\right)^2 + (y+2)^2 &= \frac{25}{4} \end{aligned}$$

+ $\frac{9}{4}$
+ 4 $\frac{16}{4}$

$C\left(-\frac{3}{2}, -2\right) \quad r = \frac{5}{2}$

General Form

$x^2 + y^2 + ax + by + c = 0$

 $a, b, c \in \text{Real}$ Find the equation a circle with $C(2, -1)$ that goes through $(5, 3)$

$$\begin{aligned} r^2 &= (x-2)^2 + (y+1)^2 \\ &= (5-2)^2 + (3+1)^2 \end{aligned}$$

← Plug in

$$r^2 = 9 + 16$$

$$r^2 = 25$$

$$25 = (x-2)^2 + (y+1)^2$$

Find the equation a circle with $C(4, 3)$ that goes through $(8, 12)$

$$\begin{aligned} 97 &= (x-4)^2 + (y-3)^2 \\ r^2 \end{aligned}$$

Find the equation a circle with diameter endpoints $(-5, -1)$ and $(-1, -1)$

$$M\left(\frac{-5+(-1)}{2}, \frac{-1+(-1)}{2}\right)$$

Center $(-3, -1)$

$$r^2 = (x+3)^2 + (y+1)^2$$

$$4 = (x+3)^2 + (y+1)^2$$

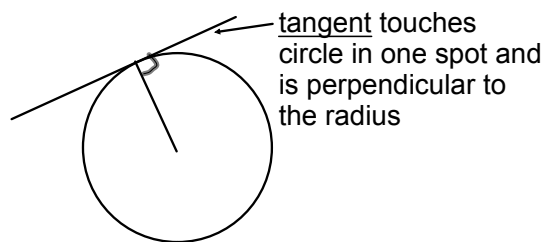
Find the equation a circle with diameter endpoints $(3, -4)$ and $(7, 2)$

$$C(5, -1)$$

$$r^2 = (x-5)^2 + (y+1)^2$$

4 +9

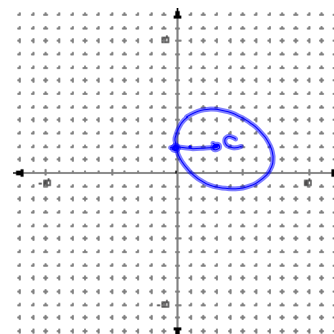
$$13 = (x-5)^2 + (y+1)^2$$



Find the equation a circle, whose center is in quadrant I, with a radius of 3 and is tangent to the y-axis at (0, 2).

$$C(3, 2)$$

$$9 = (x-3)^2 + (y-2)^2$$



HW

p429-430

16, 17, 19-21, 24, 27, 33, 34, 39,
43, 47